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EXERCISE EQUIPMENT WITH MULTI-POSITIONING HANDLES

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a non-provisional application based on U.S. Provisional Patent Application Serial No. 60/201,621, filed May 3, 2000, entitled "Exercise Equipment With Floating Wrist Structure And A Back Extension Invention," the contents of which are hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

This invention relates to the field of exercise equipment, and particularly to the field of load-bearing exercise equipment. More particularly, this invention relates to the field of handle assemblies for use with the load-bearing exercise equipment.

BACKGROUND

Current exercise equipment typically has rigid handles in a fixed position for actuating a load on the exercise machine. These handles are generally required to be in a fixed position to provide stable actuation of the load on the exercise machine. Unfortunately, these handles limit the range of motion of the user's hand and wrist during the use of the equipment. This limitation of the movement of the hand and wrist throughout the range of motion of the particular exercise machine can cause unnatural strain on the user's body. Generally this strain is caused by the user's hand being forced into a position that is not a natural position. The unnatural strain exerted on the user's body, coupled with the load of the exercise machine exaggerating the strain, and the unnatural position of the user's hand, often results in a substantial amount of discomfort for the user, or even worse, injury to the user.

It would be desirable to provide a rigid handle that allows for natural hand and wrist movement throughout the range of motion of an exercise machine. The present

invention provides such a handle assembly which until now has not been known in the art.

SUMMARY OF THE INVENTION

The present invention provides for an exercise device having a load wherein the primary movement is a pulling motion. The exercise device has an arm for actuating the load and a handle assembly attached to the arm for grasping by the user to actuate the load. The arm is attached to a load by any known means, such as a cable and pulley system, as is well-known in the art. The handle assembly is rotatable with respect to the arm around an axis of rotation, and is pivotable in at least two directions orthogonal to the axis rotation. The structure attaching the handle to the end of the arm in this floating manner allows the handle to move to a variety of locations during use. The floating handle structure allows the handle to be rotated about the axis of rotation and bent away from the axis of rotation by at least two orthogonally positioned pivot points. This provides a free range of motion for the hand and wrist during the exercise motion.

The present invention also provides for an exercise device having a load wherein the primary movement is a pushing motion. The exercise device has an arm for actuating the load and a handle assembly attached to the arm for grasping by the user to actuate the load. As above, the arm is attached to a load by any known means, such as a cable and pulley system, as is well-known in the art. The handle assembly is rotatable with respect to the arm about an axis of rotation, and the handle grip is actually rotatable in the user's grasp relative to the handle frame. The handle assembly in the exercise device having a load wherein the primary movement is a pushing motion is limited to rotation because any additional motion allowed is not practical when using handles to push a load.

In the figures of this application, an XYZ coordinating system may be shown as an aid to understanding the rotation of the handle assembly according to the present invention.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1A shows an exercise machine allowing the user to do a seated bench press wherein the primary movement is a pushing motion.

Fig. 1B shows an exercise machine allowing the user to do a seated military press wherein the primary movement is a pushing motion.

Fig. 2A shows an exercise machine allowing the user to perform a seated lat pull down motion exercise, wherein the primary movement is a pulling motion.

Fig. 2B shows an exercise machine allowing the user to perform a seated row, wherein the primary movement is a pulling motion.

Fig. 3 is a end view of the present invention wherein the handle extends to either side of a portion of the arm to which it is attached.

Fig. 4 is a section view taken along line 4-4 of Fig. 3 showing the articulating and rotating link structure extending between the handle and the arm portion of the exercise machine that allows movement of the handle in three dimensions, as well as rotation for use on an exercise machine where the primary movement is a pulling motion.

Fig. 5 is an exploded view of the articulating and rotating handle shown in Fig. 4.

Fig. 6 is a drawing of handle of the present invention of the articulating and rotating handle of the present invention bent orthogonally to the left with respect to the axis of rotation.

Fig. 7 shows the articulating and rotating handle in the position with the handle extended in line with the axis of rotation.

Fig. 8 shows the articulating and rotating handle of the present invention bent at a 90° angle to the right with respect to the axis of rotation.

Fig. 9 is an end view of the handle of the articulating and rotating handle with the hand grip extending in line with the arm member of the exercise machine.

Fig. 10 is an end view of the articulating and rotating handle of Fig. 9 with the handle having been rotated 90° from the position shown in Fig. 9.

Fig. 11 is a side view of another embodiment of the handle showing the side members of the bracket where one portion of the side member of the bracket is significantly larger than the other portion of the side member of the bracket.

Fig. 12 is a section taken along line 12-12 of Fig. 1, and shows the rotational structure attaching the handle to the exercise arm, and also shows the rotating structure attaching the hand grip portion to the handle bracket.

Fig. 13 is an exploded view of the embodiment of the handle shown in Fig. 12.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention is directed to exercise equipment having a handle assembly which provides for natural movement of the hand and wrist throughout the range of motion occurring during the use of the exercise machine. The handle assembly provides for this natural movement while maintaining the structural rigidity required for use on the exercise machine. The handle assembly 20 of the present invention is applicable to an exercise machine wherein the primary movement is a pushing movement, such as a seated bench press 22 or a seated shoulder press machine 24 (see Figs. 1a and 1b, respectively); a machine wherein the primary movement is a pulling movement, such as a lateral pull down machine 26 or a seated row machine 28 (see Figs. 2a and 2b, respectively); or any other machine which utilizes a weight stack or other load and a load transfer system, such as a cable and pulley mechanism. With respect to an exercise machine wherein the primary movement is a pulling movement, the handle assembly 20 preferably rotates about a rotation axis and pivots in at least two directions orthogonal to the rotation axis. With respect to an exercise machine wherein the primary movement is a pushing movement, the handle assembly 20 preferably only rotates about a rotational axis. Preferred embodiments for the handle assembly will be discussed in more detail below.

Figs. 1a, 1b, 2a, and 2b show examples of exercise machines utilizing the handle 20 of the present invention. In common, the exercise machines each have a base 30, a weight stack or load 32, a mechanism support 34, at least one arm assembly 36 and at least one handle assembly 20 attached to the arm assembly 36. The common elements are numbered similarly between the machines. The mechanism support 34 is attached to the base 30 and includes an adjustable seat 38. The load 32 is operably connected to the arm assembly 36 which is in turn operably connected to the handle assembly 20. The operable connections are such that when the user grasps the handle assembly 30 and exerts a force in the proper direction, the load 32 is actuated. The load 32 is preferably a stack of weights slidably mounted on at least one vertical rail. The load 32 is preferably configured to allow for varying number of weights to be selected by the user such as by pin selection, as is know in the art. The operable connection between the load 32 and the arm assembly 36 is preferably a cable and pulley system designed to

connect the arm 36 to the load 32 such that when the arm 36 is moved the load 32 is actuated. The operable connection between the handle assembly 20 and the arm assembly 36 will be discussed in more detail below.

Fig. 1a shows a seated bench press machine 22 with the handles 20 moving in the direction shown by the arrows. Fig. 1b is a seated military or shoulder press machine 24 with the handles 20 actuating the arms 36 in the manner shown by the arrows. Fig. 2a shows a seated lat pull down 26 wherein the arms 36 are moved by the handles 20 as shown in the direction of the arrows. Fig. 2b is a seated row exercise machine 28 with the arms 36 moved by the handles 20 in the direction shown by the arrows.

Figs. 3, 4, and 5 show the structure of the articulating and rotating handle assembly 20A in accordance with one embodiment of the present invention. This embodiment is preferably used with an exercise machine wherein the primary movement is a pulling movement, such as for those exercises performed on the machine shown in Figs. 2a and 2b. Referring first to Fig. 4, the handle assembly includes a handle bracket 40 having a base member 42. The bracket 40 is preferably U-shaped, with a grasping portion 44 rotatably mounted between the legs 46 of the U-shaped bracket. The grasping portion 44 is attached to the opposing legs 46 of the U-shaped bracket 40 by a bearing structure 48 at each end of the grasping member 44. The grasping member 44 can be cylindrical in shape, or can have a contoured shape to receive a person's hands and fingers for comfortable gripping and load bearing. The base member 42 of the U-shaped bracket 40 defines a collar 48 having a recess for receiving a first axle 50. The first axle 50 is attached in the recess by a through pin 52. The through pin 52 extends approximately parallel with the bottom portion 42 of the U-shaped bracket 40, however, any known means for attaching the axle 50 with respect to the collar would likely be acceptable. This recess can also take the form of a pair of flanges, and the through pin 52 could form a pivot axis to actually allow the handle to pivot about the pivot connection formed between the flanges and the axle 50.

The first axle 50 is in turn pivotally attached by a second pin 54 to a pivot ball 56. The second pin 54 preferably extends parallel to the first pin, but can extend in the angular orientation as desired. The pin 54 defines a pivot axis about which the handle rotates with respect to the ball 56. The pivot ball 56 is in turn attached to a second

axle 58 by a pivot pin 60, the second pivot pin 60 defining a second pivot axis about which the ball pivots 56 with respect to the second axle 58. The end of the first axle 50 attached to the pivot ball 56 defines a pair of opposing flanges 62 that surround the sides of the pivot ball 56. The end of the second axle 58 that is attached to the pivot ball 56 also defines a pair of opposing flanges 64 used in conjunction with the pivot pin 60 to attach to the pivot ball 56. The pivot pins 54, 60 attaching the flanges of the first axle 50 and the second axle 58 to the pivot ball 56 can be continuous pivot pins extending through the pivot ball 56, or can be separate pivot pins positioned through each of the flanges and partially extending into the pivot ball 56 yet still forming a pivot axis for the respective set of flanges.

The pivot axis formed by the pivot pin 54 attaching the first axle 50 to the pivot ball 56 is the first pivot axis 66. See Fig. 4A. The pivot axis defined by the pin 60 attaching the flanges 64 on the second axle 58 to the pivot ball 56 define the second pivot axis 68. The first 66 and second 68 pivot axes are positioned orthogonally with respect to one another in their attachment to the pivot ball 56. See Fig. 4A. The first pivot axis 66, with respect to Fig. 4, allows the handle bracket 40 to pivot about the first pivot axis 66 into and out of the plane of the page showing Fig. 4. In that instance, the flanges 62 on the first axle 50 pivot with respect to the pivot ball 56. The second pivot axis 68 formed between the flanges 64 on the second axle 58 formed by the connection of the flanges 64 of the second axle 58 and the pivot ball 56 allow the handle bracket 40 to pivot left and right about the second pivot axis 68 with respect to the orientation of Fig. 4. In this instance, the pivot ball 56 moves with respect to the flanges 64 of the second axle 58. The second end of the second axle 58 defines a recess 70 which receives an end of the third axle 72. The end of the third axle 72 is held within the recess 70 in the second end of the second axle 58 by a pin 74 extending therethrough. A third axle 72 is mounted to the arm 36 of the exercise machine in a rotatable manner by two bearings 76 positioned inside of a sleeve 78, through which the third axle 72 extends. The third axle 72 is held in position by a fastener 78 extending from the opposite side of the exercise arm 36 into the opposite end of the third axle 72.

Through the rotational attachment of the third axle 72 to the exercise arm 36, the first pivot axis 66 and the second pivot axis 68, the handle 20A is allowed to articulate

with respect to the exercise arm about two pivot axes 66, 68 orthogonally aligned to one another, and also rotate with respect to the exercise arm 36 about a longitudinal axis 80 directed along the length of the interconnected structure extending from the exercise arm 36 to the handle bracket 42. This structure allows for extreme flexibility in handle position when coupled to an exercise device.

For instance, if the arm of the exercise machine moves in two or three dimensions through the stroke of the exercise machine, the handle 20A as described above, allows the user to naturally position their hands and wrists to best orient their hands and wrists during the exercise. The pins 52 and 74, respectively, attaching the first axle to the collar 48 on the handle as well as the third axle 72 to the end of the second axle 58, given the correct structural modifications, can also each act as additional pivot axes to provide four total pivot axes and one rotational axis. In addition, the hand grip 44 rotates with respect to the handle bracket 42 to provide yet another degree of freedom in allowing the user to automatically adjust the grip during the pulling exercise.

Referring to Fig. 4b, the pivot ball 56 is formed of a short cylinder having beveled top 82 and bottom 84 edges transitioning from the cylindrical wall 86 to the flat top 88 and bottom 90 surfaces. Two flat spots 92 are formed in diametrically opposing positions along the outer curved sidewalls of the cylinder along the entire length of the cylinder. As shown in Fig. 4A, one set of flanges 62 engages the flat top 88 and bottom 90 of the cylinder and the other set of flanges 64 engages the flat sidewalls 92 of the cylinder.

Fig. 5 is an exploded view of the articulating and rotating handle 20A embodiment of the present invention. The handle 20A is attached in an articulating and rotating relationship with the exercise handle as described above. The exercise handle 20A defines a collar 78 into which is positioned two bearing structures 76, such as ball bearings. The ball bearing structures receive an end of the third axle 72 which is attached to the exercise arm 36 and inside the collar by a fastener 78. The first end of the third axle 72 inserts into a recess 70 formed in the second end of the second axle 58 as held therein by a press fit pin 74. The first end of the second axle 58 is attached to the pivot ball 56. Two flanges 64 are formed at first end of the second axle 58 to surround the pivot ball 56. Each flange 64 defines an aperture 94 which is aligned with a corresponding aperture 96 formed in the pivot ball 56 to receive a pivot pin 60, or pins

depending on the design, which forms the second pivot axis 68. The pivot ball 56 is attached to the second end of the first axle 50 in a similar manner. The second end of the first axle 50 defines two opposing flanges 62 which also define apertures 96 (in dash). These apertures 96 are positioned in alignment with apertures 98 formed in the pivot ball 56 and a pin 54 or pins are positioned through the apertures 96 in the flanges 62 on the second end of the first axle 50 to attach to the pivot ball 56 to form the first pivot axis 66. The first 66 and second 68 pivot axis are offset by 90° from one another. The first end of the first axle 50 is received within a recess formed by a collar 48 on the bottom 42 of the handle bracket 40. The first end of the first axle 50 is attached or secured within the collar 48 by a press fit pin 52. The grip handle 44 has an inner cylinder 100 and an outer cylinder 102, the outer cylinder 102 being made of a cushioning material and the inner cylinder 100 being made of a strong material. Either end of the gripping member 44 is fit over a bearing 47 through which is positioned a bolt 104 to hold the gripping 44 member to the handle bracket 40 in a rotating relationship.

Figs. 6, 7, and 8 show the relative motion of the handle 20A with respect to the attachment structure given its construction. Fig. 6 shows the pivot ball 56 and the first axle 50 pivoting around the second axis 68 to a position offset 90° from the axis of rotation 80. The handle 40 can pivot about the second axis 68 to the mirror image shown in Fig. 6 so that the handle bracket 40 extends to the right in this configuration. This is shown in Fig. 8. Fig. 7 shows the handle in a vertical alignment with the pivoting structure and the axis of rotation 80. With respect to Fig. 7, the handle 40 can pivot into and out of the page around the first pivot axis 66 and therefore moves with respect to the second axle 58 and pivot ball 56.

Fig. 9 is an end view of the handle 40 with the gripping member 44 in alignment with the exercise arm 36. The rotational mounting of the third axle 72 to the exercise arm 36 allows the exercise handle 20A to rotate about the axis of rotation 80 by 360°.

The combination of the articulating and rotating motions shown in Figs. 6, 7, 8, 9, and 10 provide an extremely versatile and motion of the handle 20A to allow the user in a pulling exercise to align their hands and wrists as desired with respect to the load. This

applies for both the pulling motion and the reverse extending motion. This type of motion is found in exercise machines such as those shown in Figs. 2a and 2b.

Figs. 11, 12, and 13 show an embodiment of the handle 20B used on exercise machines where the primary motion is one of pushing as opposed to pulling. The elements similar to those on handle 20A are similarly labeled. These types of machines are shown in Figs. 1a and 1b. Because the handles 20B are used for pushing, the articulation of the handle with respect to the exercise arm 36 is eliminated and the rotation of the handle with respect to the exercise arm 36 remains to allow for some adjustment of the user's hands with respect to the exercise arm 36 during the stroke of the exercise. Fig. 11 shows the handle bracket 110 attached to an end of the exercise arm 36 in a rotational relationship. The base 112 of the handle bracket 110 has an asymmetrical shape about the axis of rotation 80 such that one side 114 is wider and thus heavier than the other side 116. The wider and heavier side 114 causes the handle 20B to pivot to a particular upright position with the heavier side 114 pointing downwardly when the exercise arm 36 is positioned in a relatively vertical plane such as that shown in Figs. 1a and 1b. Note that in Figs. 1a and 1b the wider and heavier portion 114 of the handle bracket 110 is pointed downwardly. This is to orient the handles in a fixed manner for the user as the user enters the machine and prepares for the exercise.

Fig. 12 shows a cross-section of the handle 20B of this embodiment and the rotational connection of the axle 118 extending from the base of the handle bracket 110 with the exercise arm 36. The handle bracket 110 is generally U-shaped, however the legs 120, 122 of the handle bracket are angled both to one side relative to the base 112, with one leg 120 being longer than the other leg 122, to provide an angle of the gripping member 44 with respect to the base 112 of the handle bracket 110, and also with respect to the exercise arm 36. The longer of the two legs 120 of the handle bracket 110 is on the end having the heavier and wider portion so that when the exercise arm is at rest in a relatively vertical orientation, the gripping member 44 is angled upwardly and away from the user when the user is sitting in the exercise machine. In this embodiment, the hand grip portion 44 is rotatably mounted between the legs 122, 120 of handle bracket as is disclosed above. This angled handle can also be used with an articulating handle for exercise equipment having a pulling motion such as those shown in Fig. 2a and 2b.

Fig. 13 is an exploded view of the handle 20B of this embodiment and shows the bearing 76 fitting into a collar 78 formed in the end of the exercise arm 36. The post 118 extending from the base 112 of the handle bracket 110 extends through the bearings 76 and into the collar 78 and is held in place by a fastener 79 extending into the end of the post 118. The hand grip 44 is rotatably mounted between the extending arms 120, 122 of the handle bracket 110 as described above. In use, the handle 20B can rotate along the rotational axis 80 defined by the post 118 extending from the bottom 112 of the handle bracket 110 to allow the user to adjust the rotational angle of the handle bracket 110 of the handle with respect to the exercise arm 36 about the rotational axis 80 formed by the post 118.

The handle assemblies 20A, 20B discussed above are preferably constructed of metal such as carbon, steel or stainless steel, or can be made of hard impact resistant plastic for durability. The bearings are preferably metal ball bearings but these joints can be created by any other complex universal joint that would allow for rotation about an axis of rotation.

In operation, for example, in using the exercise machine 28 as shown in Fig. 2b, the user sits on the seat and rests against the front support. The weight desired for the exercise motion is selected at the stack 32. The user grasps a handle 20A in each hand and pulls the exercise arms 36 towards the user's chest, either individually or together as desired. With respect to the machine 28 shown in Fig. 2b the user can grasp a handle assembly 20A with the palm faced down and as the handle is moved toward the user, the hand can be rotated inwardly to a palm face up position. This allows the user to flex their wrists through a full 180° during the course of the exercise stroke. The floating handle assembly 20A thus allows the hand to be positioned as is natural for the user and does not force any one particular hand orientation. In addition, the hand does not have to be rotated during the exercise, or the hand can be rotated oppositely from that described.

The user's hands can be similarly rotated during the exercise stroke for the machines that require primarily pushing motion. Additionally, for the machines requiring primarily a pulling motion, the hands cannot only be rotated, but the hands can be moved inwardly, outwardly, or any direction with respect to the rotation axis as desired by the user due to the articulating structure described above.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various other changes in structure or form and detail may be made without departing from the spirit and scope of the invention. Presently preferred embodiments of the present invention and many of its improvements have been described with a degree of particularity. It should be understood that this description has been made by way of example, and that the invention as defined by the scope of the following claims.